Undergraduate Certificate in Offshore Pipeline Engineering

Materials and Corrosion Control

Materials and Corrosion Control Glossary

Alloy: A mixture of two or more metals, or a metal and a non-metal, to produce a material with desirable properties such as increased strength, corrosion resistance, or heat resistance.

Anode: The electrode in a corrosion cell that undergoes oxidation, releasing electrons to the cathode, which prevents corrosion of the metal it is protecting.

API: American Petroleum Institute; an organization that develops standards for the oil and gas industry, including specifications for materials used in pipelines.

ASTM: American Society for Testing and Materials; an organization that develops and publishes standards for materials and products, including those used in the oil and gas industry.

Carbon Steel: A type of steel that contains a higher percentage of carbon than other types of steel, making it more susceptible to corrosion in certain environments.

Cathode: The electrode in a corrosion cell where reduction occurs, receiving electrons from the anode to prevent corrosion of the metal it is protecting.

Coating: A protective layer applied to the surface of a material to prevent corrosion or other forms of degradation, such as epoxy coatings or thermal spray coatings.

Corrosion: The degradation of a material due to chemical or electrochemical reactions with its environment, leading to the loss of material and potential failure of the component.

Crevice Corrosion: A form of localized corrosion that occurs in narrow gaps or crevices between two surfaces, where oxygen is depleted, leading to accelerated corrosion.

Galvanic Corrosion: A type of corrosion that occurs when two dissimilar metals are in contact in the presence of an electrolyte, leading to the more active metal corroding.

HIC: Hydrogen-induced cracking; a form of cracking in steel caused by the diffusion of hydrogen into the metal, which can lead to catastrophic failure.

Hydrogen Embrittlement: A phenomenon where hydrogen atoms diffuse into the metal lattice, reducing its ductility and toughness, leading to brittle fracture.

Inhibitor: A chemical substance added to a corrosive environment to reduce or prevent corrosion by adsorbing onto the metal surface and forming a protective film.

Inspection: The process of visually examining, measuring, and testing components to detect defects,

corrosion, or other issues that may affect their integrity.

Material Selection: The process of choosing materials based on their properties, cost, and suitability for a specific application, considering factors such as corrosion resistance and strength.

Metallography: The study of the microstructure of metals and alloys using microscopy to understand their properties, such as grain size, phase distribution, and defects.

NACE: National Association of Corrosion Engineers; an organization that develops standards and best practices for corrosion control in various industries, including oil and gas.

Passivation: The process of treating a metal surface to make it more resistant to corrosion by forming a protective oxide layer that inhibits further reaction with the environment.

Pitting Corrosion: A localized form of corrosion that creates small pits or craters on the metal surface, leading to rapid penetration and potential failure.

Protective Coating: A type of coating applied to a material to protect it from corrosion, abrasion, or other forms of degradation, such as zinc coatings or polymeric coatings.

Quality Control: The process of ensuring that materials and components meet specified requirements and standards through inspections, testing, and documentation.

Stress Corrosion Cracking: A form of cracking that occurs in a material under tensile stress in a corrosive environment, leading to brittle fracture without significant plastic deformation.

Surface Preparation: The process of cleaning and roughening a material's surface before applying a coating to ensure adhesion and prevent corrosion under the coating.

Ultrasonic Testing: A non-destructive testing method that uses high-frequency sound waves to detect internal defects, cracks, and corrosion in materials.

Welding: The process of joining two or more materials together by melting them and allowing them to cool and solidify, often used in pipeline construction and repair.

X-Ray Fluorescence: An analytical technique that uses X-rays to determine the elemental composition of materials, including metals, coatings, and corrosion products.

Zinc Sacrificial Anode: A galvanic sacrificial anode made of zinc that is attached to a metal structure to protect it from corrosion by preferentially corroding in its place.